Geographic Information System Strategy

California GIS Strategy

The paper outlines the strategies for a robust California Geographic Information System (GIS). The strategy contains four key points;

- Implement statewide policy which proliferates, sustains and encourages GIS innovation and use;
- Identify operational steps to develop the infrastructure, increase collaboration, and implement sound governance;
- Recommend GIS infrastructure consolidation through business driving information technology; and
- Align GIS data services and investment with enterprise architecture.

The strategy identified above is articulated through the functional components data, people, IT Infrastructure, policy and standards and products and services.

	Policy Role	Operational Role	Consolidation Role	Enterprise Role
Data	1) Establish authority leads for each framework dataset as a matter of state (OCIO) policy 2) Require geocoded data	Increase GIS data availability by publishing state data as GIS data services	Consolidate data reporting at CalAtals;	Develop essential data services
People	Bring current GIS classifications into the 21st century	1) Implement sound governance for data stewardship 2) Define a small focused staff to direct GIO functions	Align with GRP so enterprise GIS staff are consolidated; outreach to Agencies to ensure data is consolidated at the agency level	Develop enterprise capacity at OTS
IT Infrastructure	1) Establish MSAs for GIS products and services making it easy for departments to implement 2) Collaborate with Science based computing at key locations (eg National Labs)	Increase GIS Capacity in Agencies, and assure that this increase is strategically aligned and not duplicative	Through policy memo's ensure infrastructure is consolidated at Agency levels at refresh	Implement data services which 1) publish geographic data and 2) return ancillary geographic data
Policy & Standards	Set statewide policy and standards relating to GIS	Work through the GIS Council to vet and adopt standards	Through policy memos ensure state GIS usage is focused on a handful (rather than dozens) of GIS technologies	Ensure the enterprise development fosters standards established
Products & Services	Establish the CalAtlas as the centerpiece of GIS for California	Work with EA to define enterprise issues; key issue #1 - Geocoding	Ensure GIS data, services and metadata are published through a common portal (CalAtlas)	Develop future products and services meeting the needs of many

Geographic Information System Strategy

Outlined below is the role of GIS, the current state of GIS in California, desired future state, and the strategy for achieving that state.

Role of GIS in 21st Century State Government

Decision makers, in both the public and private sector are realizing that the challenges of implementing effective action in complex, dynamic long-term policy areas require both new analytic tools and new ways of collaborating between disparate stakeholders. These tools must be sophisticated enough to deal with the complexities of the public policy arena and must also be highly user friendly. Geographic Information Systems (GIS) meet this sophistication / user friendly requirement.

GIS are powerful technologies that use digital map information to connect vast amounts of information by their geographic location. GIS helps decision makers visualize and understand complex situations and relationships, identify and compare the relative merits of alternate scenarios, more accurately and comprehensively predict outcomes, productively engage stakeholders and build consensus, and evaluate the effectiveness of actions taken. With GIS technology, maps can represent layers of disparate information that can be combined, analyzed and displayed in space and time to show multi-stakeholder group patterns that they could not otherwise see of or determine with paper maps or single-factor databases. Specifically:

- GIS technology is capable of integrating, analyzing and displaying geographically referenced information
- GIS is a tool that allows users to analyze spatial and temporal information and display the relevant structures and operations that exist in a designated area
- GIS technology has a number of value-added functions including: infrastructure planning resource and asset management and environmental impact assessment.

Deploying GIS technologies throughout California will enable improvements in healthcare, public safety, education, and the economy for citizens of the State GIS embodies the notion of a digital or electronic map as an interface to a rich array of information linked to or associated through geographic location. GIS helps visualize and understand complex situations and relationships, identify and compare the relative merits of alternate scenarios, more accurately and comprehensively predict outcomes, productively engage stakeholders for building consensus, and evaluate the effectiveness of actions taken. In short, GIS is an important and powerful technology helping government make more effective and adaptive decisions in the face of emerging and changing conditions.

Current State

The current state of GIS in California is strong, but not realizing it full potential. California has a proliferation of GIS resources in a highly fragmented environment. Many centers of excellence exist, but few of these centers can collaborate and share their data, infrastructure or activities with others. The Office of the State Chief Information Officer has developed an IT Capital Plan[1] which specifically calls out enterprise GIS implementation. This plan is built on the foundation of aligning business and information technology for mutual benefit. Additionally the IT Strategic Plan[2] outlines a specific strategy for managing data as an asset, a concept focused on GIS, given that nearly all data assets in the state have a spatial component.

The GIS community has developed several reports outlining the current condition. The California GIS Task Force Report [3] identifies the numbers of excellent programs implementing GIS in the State. The California GIS

[1] http://www.itsp.ca.gov/pdf/2009_Statewide_IT_Capital_Plan.pdf
[2] http://www.itsp.ca.gov/
[3] http://www.cio.ca.gov/Government/Publications/pdf/GIS_Task_Force_Report.pdf

Council developed a strategic plan[4] for robust GIS leveraging the work of local, regional, state and federal government. Finally the GIS Council has also produced a plan outlining the needed framework data[5] for California.

Our State departments have a rich assessment of GIS activities, but also the maturity of these activities vary significantly from agency to agency, department to department, and program to program. Using the National States GIS Council Fifty States Score Card, California boasts seven of the nine criteria implemented. Given the size and scope of California, the complexity of the economy and diversity of the landscape, we need to have an advanced and world class GIS infrastructure. In short we are a leader, which needs to do more.

Desired Future State[6]

The desired future state of GIS in California is one where the State and its citizens are empowered by geographic resources. In particular;

- Business and Information Technology sectors drive innovation in each other;
- Citizens take for granted the geographic infrastructure that serves to foster economic vitality, manage resources, advance health initiatives, protect the homeland, support science, govern the Nation, and otherwise enrich the lives of all Americans;
- Authoritative and interoperable data and tools are available, accessible, and routinely used;
- Citizens rely on the availability of pervasive and ubiquitous information from the public domain and a thriving marketplace;
- The value of geographic resources is so well understood by the State that its ongoing development is easily and continuously sustained;
- The community at large share a common governance structure, goals and objectives, leveraged efforts;
- Partners from all sectors work collaboratively with a common set of policies, procedures, standards, and data models;
- Roles and responsibilities for all partners are well defined and participants have incentives and are accountable for producing results;
- Coordinated policies ensure enhanced access to current data as well as enduring access to historic content valued by the state;
- Development of the geographic information infrastructure is supported by sustained and equitable cost sharing among partners;
- Incentives are in place to ensure cost-effective initiatives, continuous progress, and innovation;
- A skilled and educated work force is in place to exploit the full potential of geospatial resources to benefit society;
- The State provides world class leadership in the geospatial community; and
- Emerging business technologies embrace the concept of place.

Strategies to get there

The strategies identified to achieve this desired future state are 1) Policy, 2) Operational, 3) Consolidation, and 4) Enterprise based. The strategy is articulated through the functional components data, people, IT infrastructure, and policy and standards.

[4] http://www.cgia.org/CA%20StrategicPlan%20P2.pdf
[5] http://www.cgia.org/CA_GeoFrame_DDP_FINAL_for_Publication.pdf
[6] This vision is aligned with the vision set forth by the National Geospatial Advisory Committee (http://www.fgdc.gov/NGAC

Strategy 1: Implement statewide policy which proliferates, sustains and encourages innovation in GIS.

The California Office of the State Chief Information Officer (OCIO) has the authority to direct Information Technology policy through the use of state Policy Letters, Memorandum, changes to the State Administrative Manual, and State Information Manual. The Geographic Information Officer (GIO), working through the governance of the state IT Council, and the State GIS Council, will initiate, vet, and produce policy which drives to the desired end state. The policy objectives are:

Data – Under the direction of the GIO, and through the GIS Council, authority for the stewardship, maintenance and publication of each of the framework GIS layers outlined in the Framework Data Plan (see footnote 5) will be identified as individual agency, departments, programs or collaborative working groups. These entities will develop business and strategic plans for the datasets, assemble, document, and quality control the data. The data will be published via CalAtlas[7]. In addition, as a matter of state policy, those entities with geographic data in current coffers will be required to geocode their data. Working through the Office of Technology Services, the GIO will enable set of services which will geocode data and publish geocoded data for publication and collaborative use.

People – GIS requires a broad range of skills, knowledge and abilities, including but not limited to, the understanding of geographic techniques and principles, quantitative data analysis, collaborative work, and IT principles, application development and project management. Current civil service classifications and processes do not adequately meet this need, are not brining in the required talent and thwart advances to our human capital. The GIO will work to refine the classification schemes and processes for advancing GIS in the state.

IT Infrastructure – GIS needs advanced computing infrastructure to store, capture, manage, and analyze geographic data. The GIO will use IT procurement vehicles, like Master Services Agreements, which makes the purchase of GIS software and services easier for state government. Additionally, due to the size, scope and complexity of some GIS data, the GIO will establish policy making it easy to partner with the advanced science community in California (e.g. San Diego Super Computer, CalIT2, Ames/NASA, National Laboratories) where science based computing is required.

Policy & Standards –The California GIS Council, the IT Council, and the GIO will develop policies and standards for the advanced use of GIS. Policies will include data sharing, emergency operations guidelines, technical operational standards, and data attribute standards. Additionally, functional service standards (e.g. like those coming out of the Enterprise Architecture Data Strategy) will be developed.

Products & Services – As a matter of state policy, the California Atlas (see footnote 7) will be the centerpiece of GIS data discovery, availability, contribution and service.

Strategy 2 - Identify operational steps to increase collaboration and implement sound governance.

Sustained funding is a critical component of world class GIS use. Currently the state is not maximizing the value of GIS, by duplicating effort, missing the mark of enterprise data and services, and reinventing infrastructure. The GIO will help align investors, people and infrastructure for a more collaborative and mature governance.

Data – The GIO, working through the IT Council and the California GIS Council will develop data services such that data about location are pushed into common applications across the state IT enterprise. This 'opening' up of data will allow for a better understanding of the state' resources, current trends and allow for policy conversations to take place on real data.

People – The GIO will codify the GIS Council as a formal body and develop a data governance committee under the IT Council as a formal group whose purpose is to deal with the complex issues of ownership, stewardship and governance. The GIO will define a small focused staff who will coordinate state GIS resources. The GIO will set policy, help coordinate GIS resources, and develop standards.

[7] http://www.atlas.ca.gov

Staff at the OTS will be used to help develop data publication services, geocoding services and geographic analysis services which will be available for use by all departments in state government.

IT Infrastructure – Through the FSR and Capital Plan process, the GIO will help align investment in enterprise GIS resources in the state. State departments are encouraged to develop contributions to the enterprise through stewarding data they collect and own, publishing that data through services, and consuming data through services, rather than duplicating data in multiple departments.

Policy & Standards – Through the IT Council and the GIS Council, the GIO will help develop policies and standards focusing on services publication. California will need to adopt common protocols for data service delivery and consumption to maximize data resources and minimize duplication of effort. These standards will likely focus on Open Geospatial Consortium Standards for web delivery.

Products & Services – The GIO will work with key business areas (e.g. Health and Human Services and Revenue generation – Franchise Tax) to develop enterprise geocoding services. This service will provide the foundation for GIS product delivery. The state must first ensure its data is spatially enabled, then develop the full suite of data and analytical services.

Strategy 3 - Recommend GIS infrastructure consolidation through business driving information technology.

The alignment of State business and IT strategic direction ensures that technology is being guided by business direction. The result is that the State is better positioned to deliver on the high expectations of Californians. The GIO will work through the IT Executive Council to ensure that business understands, appreciates and demands geographic data capture and management at the Agency level.

Data – The GIO will first consolidate data cataloging, description and discovery at the California Atlas. The CalAtlas will be the focal point of GIS data publication and dissemination. State agencies, who own data for publication, will be required to catalog, and publish their data through the CalAtlas services.

People – Through the IT Executive Committee and the GIS Council, the GIO will engage in a significant outreach program. This program will develop collaboration across business and IT resulting in more data being geocoded, more data being published and more of the right data being used in policy discussions.

IT Infrastructure – The GIO will align recommendations about GIS consolidation with IT consolidation. The expectation is to minimize duplicative data, maximize availability to authoritative data and develop an infrastructure that is driven by the needs of the agencies, leveraging the best value from each other.

Policy & Standards – The GIO will work through the GIS Council to ensure that the right GIS technologies (e.g. software and services) are employed to meet the needs of state government. We want to maximize investment and minimize proliferation of different specialized technologies where human capital is stretched thing. Our intent is to ensure whatever GIS technology we employ it meets the business need, does so cost effectively and is flexible as our needs change.

Products & Services – The GIO will work to ensure that data and services are published through a common portal. There should be one place in government where we go to catalog, publish and consume GIS data. This location by default is the CalAtlas.

Strategy 4 - Align GIS data services and investment with enterprise architecture.

Advanced GIS use requires and enterprise approach. Data and applications must be developed with a services approach, such that agencies, departments and programs are using and benefiting from the same data investments. The OCIO recommends transitioning all internet and web-deployed servers and applications to the Enterprise GIS Infrastructure at each agency; .

The alignment of State business strategic direction with IT conceptual proposals ensures that the transformative potential of technology is being guided by business direction, positioning the state enterprise

to deliver on the high expectations of Californians. The GIO will work through the IT Executive Council to ensure that business understands, appreciates and demands geographic data capture and management at the Agency level.

Data – The GIO will work with agencies and departments to ensure data is published as services in common protocols to be used across the enterprise. At a minimum, these services should include the framework GIS data and the data that assists policy decision-making.

People – The GIO will work with the Enterprise Architecture Team to ensure there is enterprise capacity at the OTS for pushing out GIS data and analysis services

IT Infrastructure – The GIO will work with the Enterprise Architecture Team, the IT Council and the OTS to implement data services which 1) publish geographic data and 2) return ancillary geographic data .

Policy & Standards – The GIO will ensure that enterprise development uses the standards and policies established by the GIS Council and the IT Council. In addition the GIO will help ensure that these standards are consistent with national and international developments.

Products & Services – The GIO will develop future products and services meeting the needs of many. This development will be accomplished through the outreach and continued publication of data as a service.